

Risk Management Overview

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RM Topics

- ◆ What is a Risk?
- ◆ What is Risk Management?
- ◆ Risk Management Needs & Philosophy
- ◆ Risk Management Process
- ◆ Some Sources of Risks
- ◆ Risk Management for the End-to-End Architecture Study
- ◆ Technology Readiness Level Example
- ◆ Points of Contact

What is a Risk?

“An important source of bad decisions is illusions of certainty...”

Kenneth Boulding, *The Value of Uncertainty*

Risk is the measure of the probability and severity of adverse effects.

Lowrance, *Of Acceptable Risk*

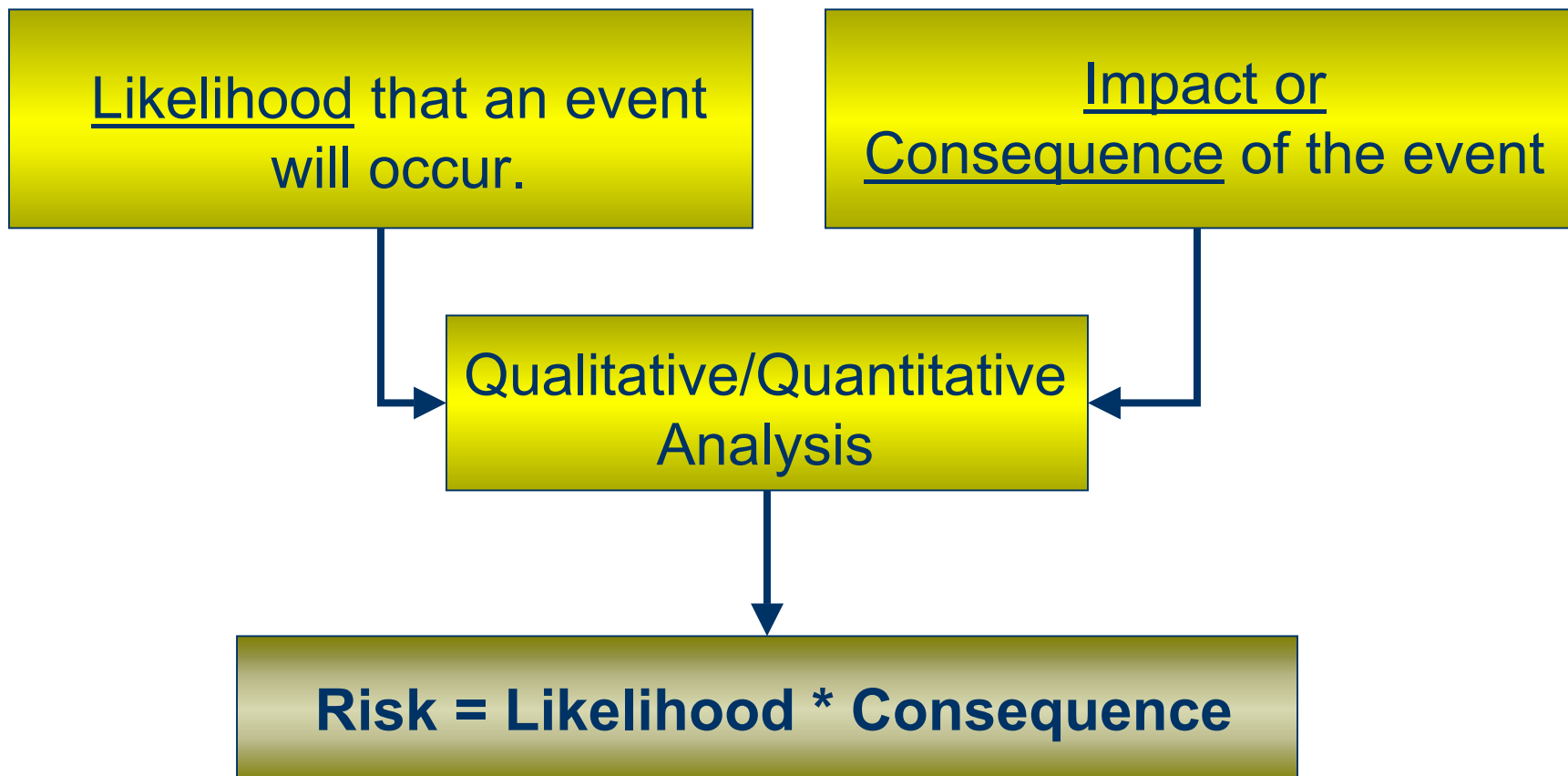
Risks – Good or bad events that may impact a project. Opportunities – Events that may positively impact a project

Mulcahy, *Risk Management Tricks of the Trade for Project Managers*

Risk is a measure of the inability to achieve overall program objectives within defined cost, schedule, and technical constraints and has two components: (1) the *probability* of failing to achieve a particular outcome and (2) the *consequences* of failing to achieve that outcome.

Department of Defense, *Risk Management Plan Guidelines*

Components of a Risk



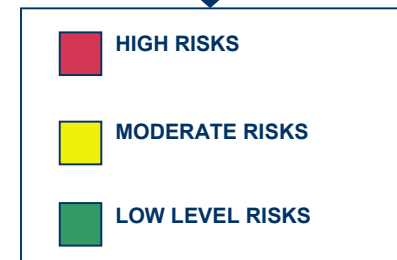
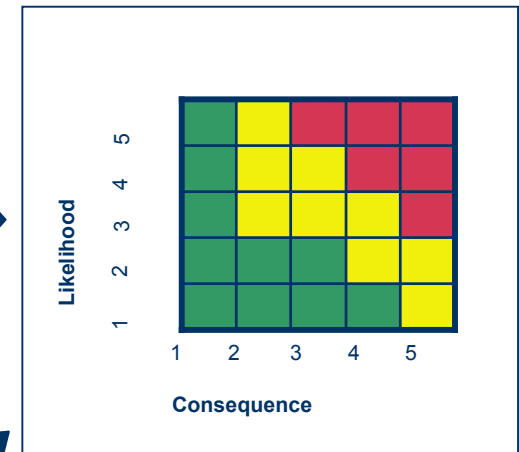
Risk Matrix Example

LIKELIHOOD

What is the likelihood the situation or circumstances will occur?		
LEVEL	LIKELIHOOD	APPROACH
5	Very High,	Nearly certain to occur, requires immediate management attention
4	High	Highly likely to occur, most cases require management attention
3	Moderate	May occur, management required in some cases
2	Low	Not likely to occur, management not required in all cases
1	Very Low	Very unlikely to occur, management not required in most cases

CONSEQUENCE

If the Risk is realized, what would be the magnitude of the impact?			
LEVEL	TECHNICAL PERFORMANCE	SCHEDULE IMPACT	COST (MILLIONS)
Very Low	Minimal impact, overall system performance unaffected	Minimal, schedule slip	Minimal, no significant cost increase
Low	Slight impact, overall system performance below goal but acceptable	Slight, additional resources required. Able to meet dates	Slight, budget increase between x and y *
Moderate	Moderate impact, system performance below goal and unacceptable	Moderate, will miss need date, crit path unaffected	Moderate impact, budget increase btwn x and y *
High	High impact, overall system performance below acceptable limits but manageable	Major schedule slip, critical path affected	Significant cost impact, budget increase between x and y *
Very High	Very high impact, system performance unacceptable, loss of system likely	Critical schedule slip, major milestone in jeopardy	Major cost impact, budget increase between x and y *



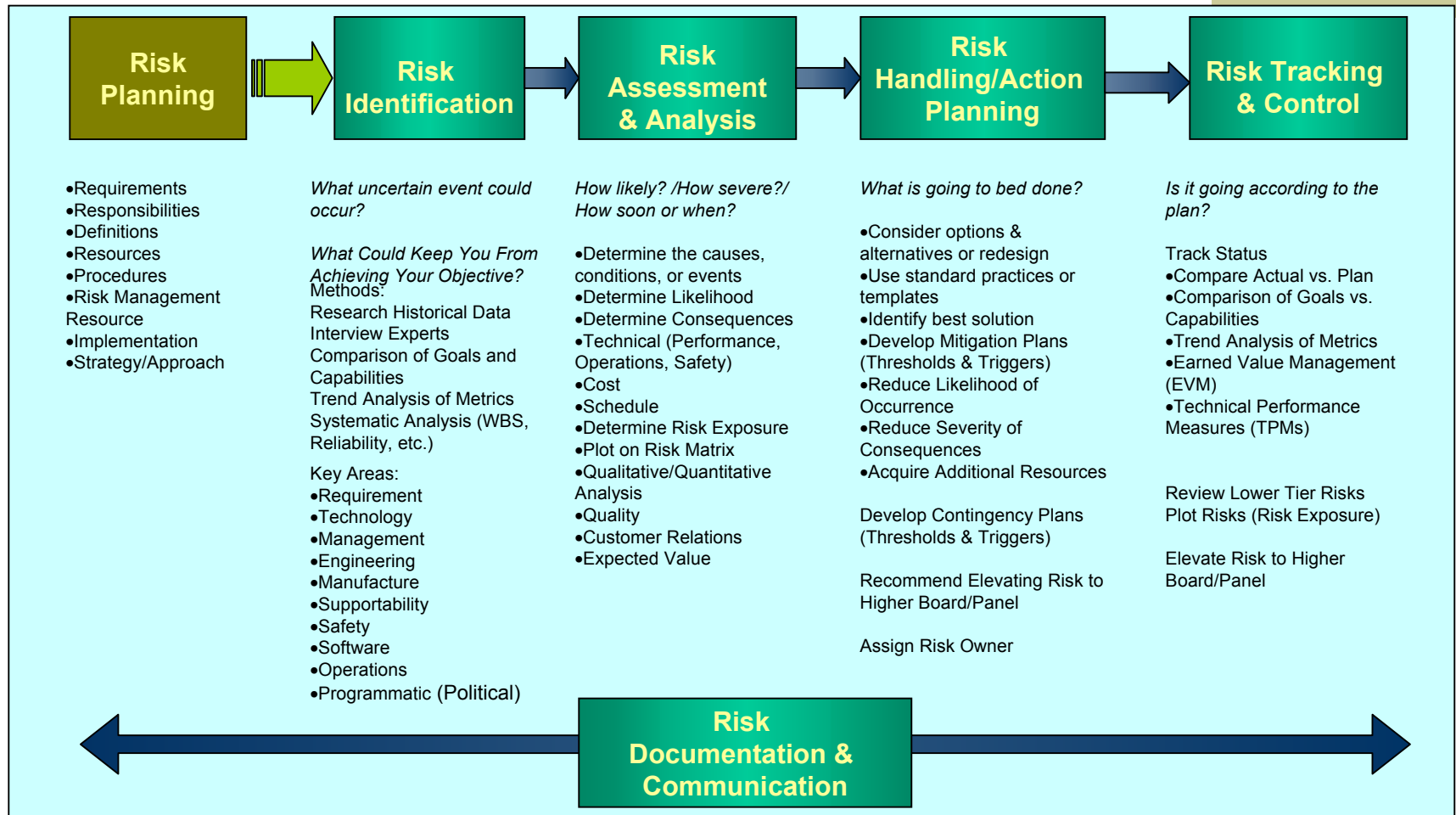
What is Risk Management?

- ◆ A management practice with processes, methods, and tools for managing risks in a program.
- ◆ A disciplined approach for proactive decision making in an environment of uncertainty to:
 - Identify
 - “What could go wrong?” (Risks)
 - “What could go right?” (Opportunity)
 - Determine which risks are important to deal with
 - Implement strategies to deal with those risks
 - Assign Risk Owner with authority and resources to implement strategies
 - Measure the effectiveness of the implemented strategies

Risk Management Needs and Philosophy

- ◆ The NESDIS Office of Systems Development (OSD) performs overall program management functions of NOAA's operational environmental satellite systems and ground system acquisitions
- ◆ NOA 208-3, MAJOR SYSTEM ACQUISITIONS requires NOAA to manage the significant cost, technical, and schedule risks associated with the acquisition of major systems aid in decision making process
- ◆ GOES-R Program Manager (PM) is taking a proactive approach to managing risk.
 - In the initial planning phases, risk identification will be initiated and will continue throughout the GOES-R Program life cycle with the goal to reduce unexpected events that require workarounds, contingency or fallback plans, and additional funding.
 - RM used as a decision-making tool to ensure safety and to enable programmatic success.

Risk Management Process



Some Sources of Risk

Technical Risk Sources

Physical Constraints

Environmental Risk Sources

Process Control Risk Sources

Critical Functions Risk Sources

Programmatic Risk Sources

Schedule Risk Sources

Cost and Budget Risk Sources

Supportability Risk Sources

Some Sources of Risk (Details)

Technical Risk Sources

Requirement Definition/Dissemination
Design Maturity/Complexity/Technology Readiness
Verification/Validation Complexity
Implementation/Application Compatibility
Use of “Heritage” Design/Hardware
Interface Definition/Control
Design for Testability, Compatibility, Survivability, and Deployability

Physical Constraints and Environmental Risk Sources

Induced/Operating Environment(s) Compatibility
Mass Budget
Power Budget
Physical Envelope
Radiation
System/Subsystem/Instrument Integration and Compatibility

Process Control Risk Sources

Specialized Fabrication/Manufacture
Process Complexity and Flow
Inspection and Surveillance Program
Quality Assurance
Parts and Materials Selection

Critical Functions Risk Sources

Centralized or Distributed Architecture
System Vulnerability/Reliability
Redundancy/Fault Tolerance
Fault Detection and Correction

Programmatic Risk Sources

Integrated vs. Distributed Organization
Consolidated vs. Matrix Responsibility
Support Services Rigor (CM, Data Management, QA, Safety, etc.)
Multi-Agency/International Partnerships
Agreements/Contracting Methods
Proactive vs. Reactive
Problem and Failure Communication/Reporting

Schedule Risk Sources

Conservative vs. Aggressive Scheduling
Critical Paths/Milestone Constraints
Technical/Cost Risk Sensitivity and Flexibility
Schedule Margins and Reserves
Lead Times
Integration/Testing Flow and Coordination
Estimate Validation and Correction
Delay/Slip Communication/Reporting
Constraints and Alternative Paths

Cost and Budget Risk Sources

Funding/Budget Phasing
Estimate Validation and Correction
Technical/Schedule Risk Sensitivity and Flexibility
Budget Margins and Reserves

Supportability Risk Sources

Human Resources (Skill, Knowledge, Experience, Availability, etc.)
Facilities and Test Equipment Availability and Cost
Shipment and Delivery Methods/Constraints

Risk Management for the End-to-End Architecture Study

- ◆ Provide information to decision makers at all levels to evaluate technical performance, safety, cost, and schedule risks
- ◆ Ensure synergy/compatibility with Architecture Study's purpose and intent:
 - "...to research and develop concepts and technologies that will enable the GOES-R Program to meet future environmental requirements with greater efficiency and effectiveness."
 - "...help refine NOAA's requirements, identify feasible potential designs, recognize ways to interrelate the segments, culminate in a top-level architecture, and identify the most significant risks."

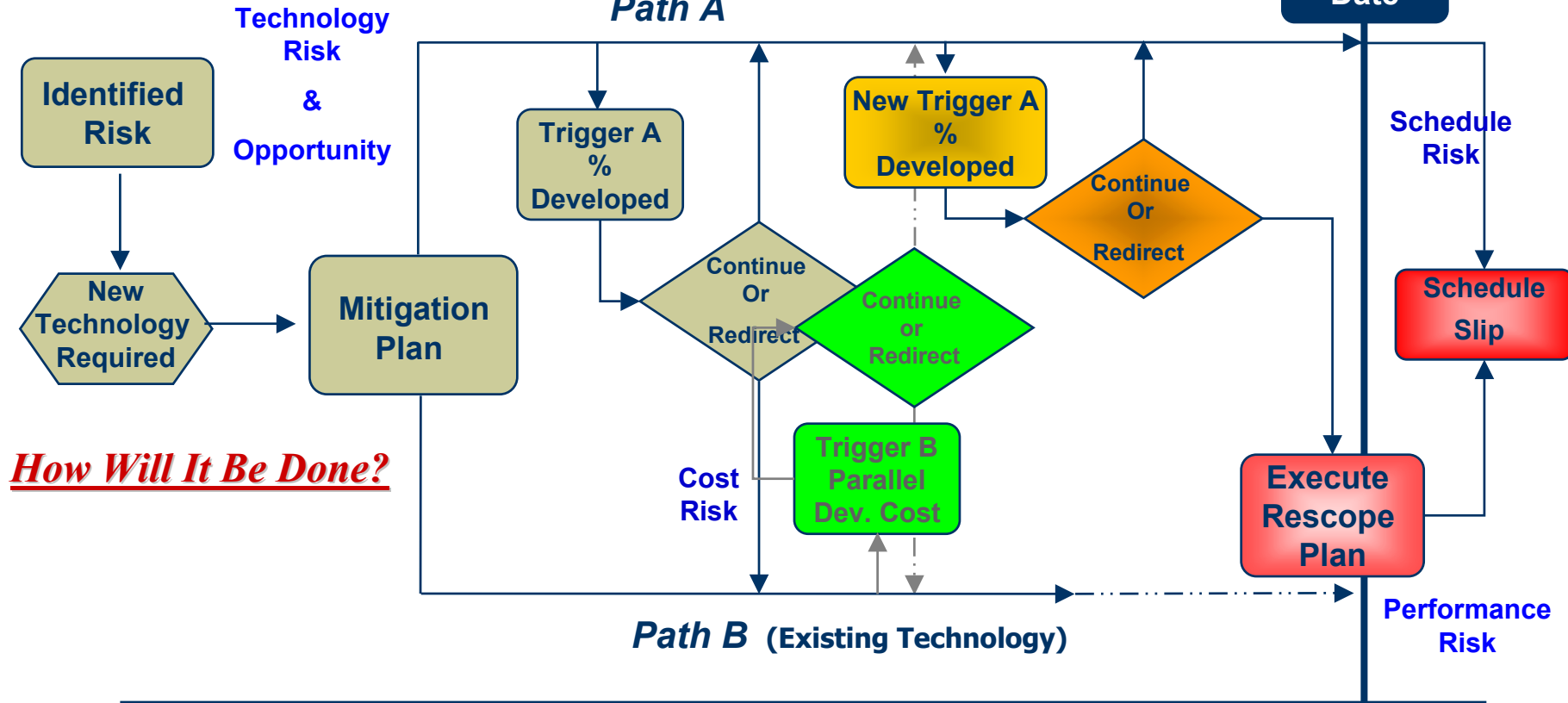
Risk Management for the End-to-End Architecture Study

- ◆ Identify the most significant risks associated with the proposed design, processes, approaches, and/or top-level architecture
- ◆ Address mitigation options for those most significant risks that may include a implementation “road map” and potential fallbacks (options & alternatives).
 - Complete mitigation & measure (Green)
 - Intermediate mitigation & measure (Yellow)
- ◆ Provide an understanding of assumptions made, methods (qualitative or quantitative) used, and the areas/level of uncertainty associated with proposed approach
- ◆ Example: Technology Maturity
 - Technology Readiness Levels (TRL) identified for advanced technology proposed,
 - Path for achieving TRL 6.
 - Parallel path for existing technology to mitigate risk

Technology Readiness Level Example

Can It Be Done?

Is It Being Done According to the Plan?



Asking the Right Question

“A vital point that needs to be made is that even an approximate answer to the right question is far more reliable and valuable than an ‘exact’ answer to a wrong question.”

Risk and Reliability Appraisal on Microcomputers

G. Singh & G Kiangi

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